

REMARKS

The following remarks are submitted in light of the telephonic Examiner Interview conducted on 9 August 2006 and Final Office Action dated 14 July 2006. Claims 1-5 and 13-16 are presented for examination of which Claims 1 and 13 are the only independent claims. Claims 6-12 and 16-20 stand withdrawn in response to a Restriction Requirement dated 18 October 2005. No new matter has been added.

EXAMINER INTERVIEW

Applicants gratefully acknowledge the courtesies extended by the Examiner during the Examiner Interview on 9 August 2006. During the Examiner Interview the following was discussed (1) the 35 U.S. §103 rejection applied against Claims 1 and 13 as being unpatentable over U.S. Patent No. 6,709,562 Andricacos et al. ("Andricacos") and (2) the amendment to Claim 13 as presently presented herein.

With respect to the 35 U.S. §103 rejection applied against Claims 1 and 13 as being unpatentable over Andricacos, Applicants explained during the Examiner Interview that Andricacos fails to teach, suggest, or disclosure both (1) a impure copper seed and (2) that the material composition of the impure copper seed is substantially the same as the material composition of the impure copper fill. Both are required limitations of independent Claims 1 and 13.

With respect to the amendment to Claim 13, Applicants explained during the Examiner Interview that the amendment to Claim 13 was to correct antecedent basis because while the term "impure copper seed" has antecedent basis, the term "seed layer" does not have antecedent basis.

On a final note during the Examiner Interview, Applicants asked the Examiner to confirm that the drawing objection issued in the Office Action dated 12 January 2006 had been withdrawn. The Examiner confirmed that the drawing objection had in fact been withdrawn.

Applicants thank the Examiner for the time and attention freely volunteered during the Examiner Interview.

REJECTION OF CLAIMS 1-5 AND 13-15 UNDER 35 U.S. §103

As discussed herein above, Claims 1 and 13 stand rejected under 35 U.S. §103 as obvious over Andricacos. Applicants respectfully traverse the rejection because Andricacos fails to disclose, teach, or suggest at least two requirements of the claimed invention, namely (1) a impure copper seed and (2) that the material composition of the impure copper seed is substantially the same as the material composition of the impure copper fill.

Both independent Claims 1 and 13 require an impure copper seed. As described in the specification as originally filed, the impure copper seed “reduces edge erosions” and “suppresses dendritic formation.” (Specification, ¶25). The Examiner claims that use of an impure copper seed, by Applicants own admission, is well known in the art. (Final Office Action, pg. 3, line 19-pg. 4, line 2 and pg. 5, lines 8-12). Applicants stated in paragraph 20 of the specification as originally filed, which the Examiner cites as Applicants’ admission, that “such impure copper sources are generally well known in the art.” (Specification, ¶20). Applicants, however, did not state in paragraph 20 of the specification as originally filed that “such impure copper seed layers are generally well known in the art.” In fact, Applicants stated in the Background of the Invention section

that “historically a pure copper seed layer was used.” (Specification, ¶6). Applicants then elaborated that such pure copper seed layer was used because “pure copper was known to be more conductive than aluminum.” (Specification, ¶6). Therefore, contrary to the Examiner’s statement impure copper seed layers are not well known in the art, either by Applicants own admission, or as disclosed, taught, or suggested by the prior art.

Andricacos is directed to an interconnection wiring that produces void-free and seamless submicron structures through the use of “electroplating from a bath containing additives.” (Andricacos, col. 1, lines 25-30, Clms. 1, 48 & 49). Andricacos does not disclose an impure copper seed layer. Any reference to seed layer 5 in Andricacos is to a copper, Cu, seed layer. (See e.g. Andricacos, col. 4, lines 57-58, col. 9, line – 40 – col. 10, line 10). Therefore, Andricacos does not disclose an impure copper seed layer, which is required by independent Claims 1 and 13. For at least this reason, Andricacos does not disclose, teach or suggest the claimed invention.

Both Claims 1 and 13 further require that “the material composition of said seed layer is substantially the same as material composition of said impure copper fill.” The Examiner admits that Andricacos does not teach this limitation, but states that such limitation “would have been obvious to one having ordinary skill in the art at the time the invention was made to use the same material composition for both the impure copper seed layer and the impure copper fill, since it would lower the cost of making the product.” (Final Office Action, pg. 3, lines 5-10). Applicants respectfully traverse the Examiner’s first assertion, namely that use of an impure copper seed layer would have been obvious. In addition, Applicants respectfully traverse the Examiner’s second assertion, namely that use of an impure copper seed would reduce cost. With respect to

the first assertion that use of an impure copper seed layer would have been obvious, as discussed herein above, pure copper seed layer was used because pure copper was known to be more conductive than aluminum. Further, with respect to the second assertion, that use of an impure copper seed would reduce cost, is not an obvious conclusion. In fact, Applicants assert that the cost of fabricating an impure copper seed source will more likely increase the cost of interconnect fabrication.

Therefore, Applicants respectfully submit that Claims 1 and 13 are in condition for allowance and request withdrawal of the claim rejection applied against Claims 1 and 13, as well as claims 2-5 and 13-16, which depend from Claims 1 and 13. Claims 2-5 and 13-16 are allowable, Applicants respectfully submit, because of their dependence on allowable base claims.

Applicants further respectfully submit that the Claim 13 amendment should not cause undue burden and require further search because the claim term “impure copper seed” was presumably previously searched. The claim term “impure copper seed” is a required element of Claim 13 as originally filed. (Specification, Claim 13, line 6).

Finally, Applicants respectfully indicate that the Claim 13 amendment is in response to correction of an antecedent basis problem and not in response to any claim rejection applied against Claim 13. Therefore, the Claim 13 amendment should not limit any doctrine of equivalent interpretation of Claim 13 under the *Festo* line of cases.

CONCLUSION

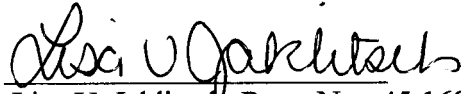
Reconsideration and allowance of the pending claims is respectfully requested.

If the Examiner has any questions or believes further discussion will aid examination and advance prosecution of the application, a telephone call to the undersigned is invited.

No fee is believed to be due for the submission of this amendment. If any fees are required, however, the Commissioner is authorized to charge such fees to Deposit Account No. 09-0458.

Respectfully Submitted,

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A handwritten signature in cursive script, appearing to read "Lisa U. Jaklitsch".

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